

# THE MINERAL INDUSTRY OF TURKEY

By Philip M. Mobbs

Turkey had a diverse and dynamic mineral industry. The nation was a leading producer of barite, boron minerals, celestite (strontium), chromite, feldspar, limestone, magnesite, marble, perlite, and pumice, and was a significant source of value-added processed mineral commodities such as cement, ceramics, glass, and steel.

The national economy continued its recovery from the severe economic crisis of 2001. Inflation declined to an annual rate of 10.6% in 2004, which was a 30-year low, down from 25.3% in 2003 and 44.8% in 2002. Turkey's gross domestic product (GDP) based on purchasing power parity was estimated to be about \$530 billion<sup>1</sup> in 2004, and the GDP per capita based on purchasing power parity was \$7,503 (International Monetary Fund, 2005<sup>2</sup>).

In 2004, total Turkish exports were valued at about \$63.1 billion compared with \$47.3 billion in 2003. Of the total exports in 2004, iron and steel accounted for about \$6.0 billion; crude oil and petroleum products, \$1.1 billion; nonferrous metals, \$664 million; crude fertilizers and crude ores, \$500 million, and metalliferous ores and metal scrap, \$299.3 million. Total imports were valued at about \$97.4 billion in 2004 compared with \$69.3 billion in 2003. Of the total imports in 2004, crude petroleum and petroleum products accounted for \$8.6 billion; iron and steel, \$5.3 billion; natural gas, \$4.4 billion; metalliferous ores and scrap, \$3.3 billion; nonferrous metals, \$2.2 billion; and coal and coke, \$1.3 billion (T.C. Başbakanlık Devlet Planlama Teşkilatı Müsteşarlığı, 2005§).

## Structure of the Mineral Industry

The private sector dominated the country's industrial minerals and metals sectors. Private-sector enterprises included exploration and production companies owned by domestic and foreign stockholders, mining and manufacturing subsidiaries of large Turkish conglomerates, and medium- and small-sized family-owned mining companies. In 2004, 40,919 new companies and cooperatives were established in Turkey, of which 392 were mining and quarrying companies (State Institute of Statistics, 2005§).

The Government had started procedures to privatize state-owned companies in 1986. Divestment of companies in the mineral sector (primarily cement companies) was most noticeable in 1989, 1992, 1993, and 1996. In 2004, privatization of mineral sector organizations resumed at a brisk pace. Establishments divested by the Government's T.C. Başbakanlık Özelleştirme İdaresi Başkanlığı (Privatization Administration) included the copper operations of Eti Bakır A.Ş. and the Samsun copper smelter of Karadeniz Bakır İşletmeleri A.Ş., which were sold to CE-KA İnşaat Madencilik San. ve Tic. A.Ş.; the low-carbon ferrochrome and ferrosilicon plant of Eti Elektrometalurji A.Ş., which was sold to Aksu Madencilik San. ve Tic. A.Ş.; the high-carbon ferrochrome plant of Eti Krom A.Ş., which was sold to Yıldırım Dış Ticaret ve Pazarlama A.Ş.; and the iron ore mines and iron-pellet plant of Divriği Hekimhan Madenleri San. ve Tic. A.Ş., (Div-Han), which were sold to Ereğli Demir ve Çelik Fabrikaları T.A.Ş. (Erdemir). The Privatization Administration planned to sell the 49.12% equity interest that it held in Erdemir, which operated domestic and foreign steel operations.

Also divested in 2004 were the silver mine and plant of Eti Gümüş A.Ş., which were sold to KSS Madencilik İnşaat Turizm San. ve Tic. A.Ş., and the Government's remaining 45% interest in Çayeli Bakır İşletmeleri A.Ş. (CBI), which was sold to the local subsidiary of Inmet Mining Corp. of Canada. The privatization of the petroleum refineries of Türkiye Petrol Rafineleri A.Ş. in 2004 was voided by the courts.

State-owned mineral enterprises that were expected to be sold by the Privatization Administration in 2005 included several fertilizer plants of Türkiye Gübre San. A.Ş. and the salt operations of Tütün, Tütün Mamulleri, Tuz ve Alkol İşletmeleri (TEKEL) A.Ş. Another attempt to privatize the petroleum refineries of Türkiye Petrol Rafineleri A.Ş. was expected in 2005. The Privatization Administration also was liquidating Türkiye Demir ve Çelik İşletmeleri A.Ş., which was a steel company.

## Commodity Review

### Metals

**Bauxite and Alumina.**—Karia Madencilik Muhendislik Nakliye San. ve Tic. Ltd. Şti. completed a prefeasibility study on its İkizcetepe bauxite exploration license near Mugla.

**Copper.**—In 2004, CBI continued to recuperate from the production disruption associated with a rockfall in 2002. A new mining plan was developed to cope with unstable ground conditions, and ore production volume was expected to recover completely in 2005. The program to deepen the mine's main shaft by 286 meters (m) was expected to be completed in early 2006 (Inmet Mining Corp., 2004, p. 5-6; 2005, p. 26-28).

In September, a fire in an underground tunnel in Eti Bakır's Küre Mine resulted in 19 fatalities and temporary suspension of mining. The tunnel, which was at a depth of 150 m, was part of the underground development of the former open pit mine that had been subcontracted to the STFA Group of Turkey.

<sup>1</sup>Where necessary, values have been converted from Turkish lira (TL) to U.S. dollars (US\$) at the average rate of TL1,448,899=US\$1.00 for 2004 and TL1,528,854=US\$1.00 for 2003.

<sup>2</sup>References that include a section mark (§) are found in the Internet References Cited section.

The Anatolia Minerals Development Ltd. and Rio Tinto Mining & Exploration Ltd. joint venture drilled the Gurculer copper-gold prospect, which was part of the Bursa exploration project in western Turkey, and the Karapinar, the Kizilviran, and the Sin copper-gold prospects in the Tunceli exploration area in central Turkey.

In 2004, the feasibility study was completed on CBI's Cerattepe exploration license, which was located near Artvin in northeastern Turkey. Based on probable reserves of 1.6 million metric tons (Mt) at grades of 8.8% copper, 1% zinc, 0.3% lead, 33 grams per metric ton (g/t) silver, and 1.4 g/t gold, a plan was developed to mine the deposit at the rate of about 250,000 metric tons per year (t/yr). Production could begin as soon as late 2006, and the proposed underground mine would employ about 90 people (Inmet Mining Corp., 2004, p. 7-8).

In 2004, the Ciner Group, formerly the Park Group, acquired the rights to develop the Siirt-Sirvan copper deposit in southeastern Turkey. The site originally had been mined at least 2,600 years ago. Nuinsco Resources Ltd. acquired an option from Noranda Inc. for the Berta copper-gold prospect near Artvin. Noranda completed a soil-sample program on the property in 2004 (Kaptan, 1990; Nuinsco Resources Ltd., 2004).

**Gold.**—Legal problems continued for the Ovacik gold mine, which had opened in 2001. The Ovacik Mine, which was located near the north end of Turkey's Turquoise Coast tourist area in western Turkey about 106 kilometers (km) north of Izmir, was owned and operated by Normandy Madencilik A.Ş. In June, Frontier Pacific Mining Corp. of Canada agreed to acquire Normandy from a subsidiary of Newmont Mining Corp. of the United States. In August, operations at Ovacik were suspended after a court decision required additional operating permits and the submission of an updated environmental impact assessment (EIA) report. The paperwork was filed and the mine appeared ready to reopen, but in October, Normandy's appeal of a lower court's decision to prohibit the use of cyanide at Ovacik was denied. Operations remained suspended at yearend (Mining Journal, 2004).

Cyanide was used by other mining operations in Turkey. The lower court ruling applied to the Ovacik Mine, which was located in a tourist region. If an extension of the prohibition of the use of cyanide for gold mining operations were to be applied to other projects, it would have a significant chilling effect on proposed gold mines in Turkey.

The Government expressed support of the gold mining sector in June when it amended the value-added tax (VAT) law. Companies in the gold, platinum, and silver sectors were exempted from paying VAT on goods and services related to exploration, production, and refining operations (PricewaterhouseCoopers International Ltd., 2004, section 5.2.1).

Eldorado Gold Corp. started construction of the Kisladag gold mine, which was located about 180 km east of Izmir. Production was expected to begin in late 2005. Eldorado continued the preparation of an EIA for the Efemçukuru project, which was located about 20 km from Izmir in western Turkey. Eldorado's subsidiary Tüprag Metal Madencilik San ve. Tic. Ltd. Şti. mapped and sampled several deposits on Tüprag's Western Pontides licenses.

Several other companies also were exploring for gold in Turkey. Aldridge Minerals Inc. of Canada completed a 1,000-m-reverse-circulation drill program on the Derinköy and the Olucak properties in 2004. Derinköy was located about 30 km southeast of Artvin in northeastern Turkey, and Olucak was located 75 km west of Trabzon in northeastern Turkey. Aldridge had acquired options on the properties from BHP Billiton World Explorations Inc. Aldridge also acquired an option on the Yenipazar property in central Turkey from Anatolia Minerals Development Inc.

In January, Anatolia Minerals acquired 100% interest in the Çöpler gold prospect. The Çöpler prospect was located about 500 km east-southeast of Ankara in central Turkey. Anatolia subsequently completed a more-than-200-hole reverse-circulation drill program. Based on the drill results, Anatolia announced a new resource estimate for the Çöpler prospect, which included measured and indicated recoverable oxide resources of 5.51 Mt at an average grade of 2.02 g/t gold and inferred recoverable oxide resources of 13.34 Mt at an average grade of 2.56 g/t gold (Anatolia Minerals Development Inc., 2004).

In September, Eurasian Minerals Inc. of Canada formed a 4-year strategic alliance with Barrick Gold Corp. under which Eurasian's subsidiary Eurasian Madencilik Ltd. would operate a regional exploration program in Turkey for the partners. Eurasian explored several prospects in 2004.

Fronteer Development Group Inc. of Canada acquired options on the Agi Dagı and the Kirazlı gold properties in western Turkey from Teck Cominco Arama ve Madencilik San. Tic. A.Ş. In 2004, Fronteer began a 6,000-m drill program at Agi Dagı and a 3,000-m drill program at Kirazlı. Fronteer ended the initial Kirazlı program after three holes and proposed to begin a new 5,000-m diamond drill program in February 2005 (Fronteer Development Group Inc., 2004, 2005).

Odyssey Resources Ltd. drilled the Altintepe and the Tavsan gold properties. Altintepe, which is located in northeastern Turkey, and Tavsan, which is located in western Turkey, had been optioned from Teck Cominco.

**Iron and Steel.**—More than 70% of Turkish steel production capacity was attributed to electric arc furnace (EAF) minimills. In 2004, the increased costs of power and domestic and imported steel scrap adversely affected Turkish EAF plants. The country's three integrated steel plants, which employed about 19,000 workers, also were affected by rising fuel and iron ore prices.

In an attempt to control iron ore prices more effectively, Erdemir, which was the leading integrated steel company in Turkey, acquired Div-Han, which produced iron ore and pellets, from the Privatization Administration. Div-Han subsequently was renamed Erdemir Madencilik San. ve Tic. A.Ş. In 2004, Erdemir also inaugurated a train ferry to connect the docks of the seaside steel plant to the Turkish State Railway.

Erdemir continued work on the expansion of its hot-rolling mills and the installation of a plate mill. In 2002, Erdemir had acquired 90.87% equity in the integrated steel producer İskenderun Demir ve Çelik Fabrikaları A.Ş. (İsdemir) from the Privatization Administration. In 2004, İsdemir completed the modernization of its wire-rod mill. Ongoing work at İsdemir that was expected to be completed in 2006 included the rehabilitation of blast furnace No. 3, which would increase the plant's iron ore requirement; the installation of coke batteries No. 5 and 6, which would add 1.3 million metric tons per year (Mt/yr) of coke production capacity to the plant; the installation of a 219,000-t/yr lime plant; and the installation of a 2.5-Mt/yr capacity slab caster. A program to expand İsdemir's steel production capacity to 5.25 Mt/yr from 2.2 Mt/yr was expected to be completed by 2010. The project to convert

İsdemir to a producer of flat steel products from the current (2004) long products configuration had been tendered and evaluation of the bids was underway (İskenderun Demir ve Çelik Fabrikaları A.Ş., 2005, p. 19-20, 23-26; Ereğli Demir ve Çelik Fabrikaları T.A.Ş., 2005§).

In 2004, the minimill Çolakoğlu Metalurji A.Ş. proposed to install a 2-Mt/yr slab caster at its plant in Gebze that would allow the company to begin production of flat steel instead of only long products such as reinforcing bar and rod. Ege Çelik San. ve Tic. A.Ş. of İzmir proceeded with the installation of a new billet caster, and Kroman Çelik San. A.Ş. proceeded with the installation of a new bar and rod mill at its plant in Gebze (Danieli Group, 2004§; Voest-Alpine Industriellen AG, 2004§, 2005§).

**Nickel.**—Bosphorus Nickel Madencilik Turzim A.Ş., which was a subsidiary of European Nickel plc of the United Kingdom (97.7% equity interest) and As Krom Madencilik Turzim Lusaat Nakliye San. ve Tic. A.Ş. of Turkey (2.3%), continued its evaluation of the Caldag lateritic nickel deposit near İzmir. In 2004, Bosphorus Nickel began the first of three trial heap-leach projects at Caldag and expected to complete a bankable feasibility study of the project in 2005. A positive study would advance the planned construction of a nickel-cobalt hydroxide plant. Production could begin in 2007 at the rate of 15,000 t/yr of nickel and 800 t/yr of cobalt contained in the hydroxide, which would be exported for further processing (European Nickel plc, 2005, p. 2, 6).

After completing a due diligence review, a trial mining program, and processing of a second 3,500-metric-ton (t) ore shipment, Oriel Resources plc of the United Kingdom withdrew from its Gordes nickel venture with Meta Madencilik Sanayi Enerji Turizm İç ve Dış Ticaret Ltd. Şti. (Meta Madencilik Sanayi Enerji Turizm İç ve Dış Ticaret Ltd. Şti., undated§).

**Zinc.**—In 2004, ZincOx Resources plc of the United Kingdom completed a prefeasibility study and began a bankable feasibility study of its Aliaga Recycling Project. ZincOx proposed to build a plant to process EAF dust and to recover 12,000 t/yr of zinc oxide. Production was expected to begin in 2007. The proposed location at Aliaga was near five steel minimills that used EAFs to melt steel scrap (ZincOx Resources plc, 2005, p. 8-9).

### *Industrial Minerals*

**Boron and Sulfur.**—In 2004, Government-owned Eti Holding A.Ş. changed its name to Eti Maden İşletmeleri Genel Müdürlüğü. Based on the results of a new 5,650-m drill program, Eti reported that the gross weight of its boron reserves were increased to about 3 billion tons. The grade of Turkish boron deposits ranged from about 24% B<sub>2</sub>O<sub>3</sub> to 46% B<sub>2</sub>O<sub>3</sub> (Erseçen, 1989, p. 39; Eti Maden İşletmeleri Genel Müdürlüğü, 2005, p. 16; Maden Tetkik ve Arama Genel Müdürlüğü, undated§).

In 2004, Eti officially opened the 100,000-t/yr-capacity Emet boric acid plant. By yearend, Eti had begun an expansion program to raise the capacity of the Emet plant to 120,000 t/yr. Also in 2004, Eti completed the 240,000-t/yr-capacity Bandırma sulfuric acid plant, which—unlike most sulfuric acid plants—would process pyrite. The company also began the expansion of the 650,000-t/yr Bigadiç Boron Works with the construction of a third concentrator that would add 325,000 t/yr of processing capacity to the Bigadiç plant. Natural gas pipelines to the Emet Boron Works and the Kirka Boron Works were under construction. Conversion of the Emet and Kirka facilities to natural-gas-fueled plants was expected to be completed in 2005. Eti also continued work on the 100,000-t/yr-capacity Bigadiç II boron grinding unit and proposed to build a 15,000-t/yr anhydrous borax plant at Kirka and a 5,000-t/yr boron oxide plant. At Bandırma, Eti proposed to expand the capacity of the 100,000-t/yr borax decahydrate plant to 145,000 t/yr and to expand the capacity of the 20,000-t/yr sodium perborate plant to 34,000 t/yr (Eti Maden İşletmeleri Genel Müdürlüğü, 2005, p. 16-17).

**Soda Ash.**—Soda Sanayii A.Ş., which was adversely affected by rising fuel oil prices in 2004, initiated plans to convert the powerplant at its Mersin soda ash facility to burn natural gas; gas was scheduled to become available in 2005 when the Government pipeline company Boru Hatları ile Petrol Taşıma A.Ş. expected to complete the 715-km Southern Natural Gas Transmission Line from Silvas to Mersin (Türkiye Şişe ve Cam Fabrikaları A.Ş., 2005, p. 25; Boru Hatları ile Petrol Taşıma A.Ş., 2004§).

In June, Eti Soda Üretim Paz. Nak. ve Tic. A.Ş. [a venture of the Ciner Group (73.96% equity interest), Eti Maden (26%), and Türkiye Vakıfbank Bankası T.A.O. (0.04%)] opened a pilot soda ash plant at Beypazarı, which was located about 115 km from Ankara. Trona was extracted by solution mining. Commercial production at the rate of 500,000 t/yr was scheduled to begin in 2007 (Eti Maden İşletmeleri Genel Müdürlüğü, 2004§).

In 2004, Rio Tinto interpreted three-dimensional seismic data that had been shot across the Kazan trona prospect, which was located 35 km northwest of Ankara. Construction of wells for solution mining and 1-Mt/yr-capacity processing facilities at Kazan was expected to begin in 2005 (Walsh, 2004§).

### *Mineral Fuels*

**Natural Gas and Petroleum.**—State-owned Türkiye Petrolleri A.O. (TPAO) was the country's leading oil producer. Most of TPAO's crude oil production was in the southeastern region; there were 29 producing gasfields and oilfields in the Batman area and another 20 oilfields in the vicinity of Adıyaman. The Thrace region in northwestern Turkey hosted primarily natural gas fields.

Offshore and onshore exploration continued, primarily in northwestern and southeastern Turkey. Offshore, the joint venture of BP plc and TPAO evaluated seismic data across the Eastern Black Sea project, and the joint venture of Madison Oil Turkey Inc. and TPAO acquired additional seismic data and discovered gas in the Ayazlı-1 well on the Western Black Sea project acreage.

### **Outlook**

Turkey's location at the eastern end of the Mediterranean Sea positions the country as a conduit for trade among Europe, the countries in the eastern Commonwealth of Independent States (CIS), and the Middle East. Bridging Asia and Europe, the 780,580-

square-kilometer Turkey also is a major energy transit corridor. Natural gas from Iran and Russia is piped into Turkey, and the proposed South Caucasus gas pipeline is to begin deliveries of natural gas to Turkey from Azerbaijan. Connection of the Turkish natural gas pipeline system with the European gas network could provide an alternative route for surplus Eurasian and Iranian natural gas to flow into Europe.

Crude oil from Iraq intermittently moved through Turkey in 2004; the frequent sabotage of the Iraqi section of the pipeline limited pumping operations. Increased pipeline security in Iraq in 2005 would allow increased pipeline throughput. The Baku-Tbilisi-Çeyhan oil pipeline is expected to be operational in 2005 and to increase oil exports (and marine traffic) through the Port of Çeyhan, Turkey, significantly.

The Government continued discussions with the Russian Government concerning the increased oil tanker traffic through the Bosphorus and the Dardanelles. Construction of oil pipelines across Thrace from the Black Sea to the Aegean Sea or across central Turkey from Samsun to Çeyhan would reduce the number of oil tankers that carry Russian oil through the Turkish Straits.

In 2004, the population of Turkey was estimated to be about 69 million, and the unemployment rate was reported to be 12%. Renewed growth of the labor-intensive construction sector is expected to benefit Turkey's employment rate and the country's aggregate, cement, clays, steel, and stone companies. The recent economic expansion resulted in record Turkish motor vehicle production; 823,000 vehicles were built in 2004. Continuation of the economic expansion is expected to increase the demand for private automobiles. In addition to the increased demand for steel products, the associated increased demand for glass for cars resulted in Trakya Cam San. A.Ş.'s proposal to add a fifth float glass line with production expected to begin in 2006. Trakya Cam employed about 2,000 employees on the four existing (2004) glass lines.

The Government's ongoing privatization program is expected to rejuvenate operations in the mineral sector. In 2004, most privatized mineral companies were sold to domestic organizations, but between June 2003, when the Foreign Direct Investment Law No. 4875 was enacted, and December 2004, 14 firms in the mining sector attracted \$689 million of new foreign investment (Boland, 2004; T.C. Başbakanlık Hazine Müsteşarlığı, 2005, p. 14; U.S. Central Intelligence Agency, 2004§).

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## Major Sources of Information

İstanbul Maden ve Metal İhracatçı Birlikleri (Istanbul Mineral and Metals Exporters' Association)

Diş Ticaret Kompleksi A-bloc Çobançeşme Mevkii

Sanayi Cad. Yenibosna-Bahçelievler

Istanbul, Turkey

Telephone: +(90) (212) 454-00-00

Fax: +(90) (212) 454-00-01

Internet: <http://www.immib.org.tr>

Maden Tetkik ve Arama Genel Müdürlüğü (General Directorate of Mineral Research and Exploration)

06520 Ankara, Turkey

Telephone: +(90) (312) 287-34-30

Fax: +(90) (312) 287-91-88

Internet: <http://www.mta.gov.tr>

T.C. Devlet İstatistik Enstitüsü (State Institute of Statistics)

06100 Necatibey Cad. 114

Ankara, Turkey

Telephone: +(90) (312) 425-84-42

Fax: +(90) (312) 417-0432

Internet: <http://www.die.gov.tr>

T.C. Enerji ve Tabii Kaynaklar Bakanlığı (Turkish Ministry of Energy and Natural Resources)

İnönü Bulvarı, No. 27 Bahçelievler

Ankara, Turkey

Telephone: +(90) (312) 212-69-15

Fax: +(90) (312) 286-47-69

URL: <http://www.enerji.gov.tr>

T.C. Petrol İşleri Genel Müdürlüğüne (General Directorate of Petroleum Works)

Ziya Gökalp Cad. No. 41 Poyraz Han

06420 Yenışehir

Ankara, Turkey

Telephone: +(90) (312) 435-51-45

Fax: +(90) (312) 435-23-64

Internet: <http://www.pigm.gov.tr>

TABLE 1  
TURKEY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2000	2001	2002	2003	2004 <sup>p</sup>
<b>METALS</b>					
Aluminum:					
Bauxite <sup>2</sup>	458,537	242,040	287,403	364,306	365,836
Alumina:					
Gross weight	155,448	145,993	152,869	162,174	169,991
Metal, smelter <sup>c</sup>	61,000	61,730 <sup>3</sup>	62,501 <sup>r, 3</sup>	63,000	60,000
Antimony: <sup>c</sup>					
Ore, mine output:					
Gross weight	6,800	6,300 <sup>r</sup>	4,800 <sup>r</sup>	12,500 <sup>r</sup>	20,107 <sup>3</sup>
Sb content	360	330 <sup>r</sup>	250 <sup>r</sup>	650 <sup>r</sup>	900
Concentrates:					
Gross weight	1,000	1,000	1,000	2,000 <sup>r</sup>	2,500
Sb content	200	200	150	400 <sup>r</sup>	500
Chromium, gross weight (34% to 43% chromic oxide) <sup>4</sup>	545,725	389,759	313,637	229,294 <sup>r</sup>	506,421
Copper:					
Mine output, exclusive of pyrite: <sup>5</sup>					
Gross weight	4,473,711	3,467,306	2,942,721	2,620,896	2,356,147
Cu content of ore	76,053	56,864	48,253	58,000 <sup>r, e</sup>	49,000 <sup>e</sup>
Metal:					
Smelter output, primary and secondary	32,550	33,504	32,550	30,400 <sup>r, e</sup>	11,500 <sup>e</sup>
Refined <sup>c</sup>	64,100	58,400	41,000	45,000	50,000
Gold <sup>c, 6</sup> kilograms	500	2,000	5,000 <sup>r</sup>	6,500 <sup>r</sup>	4,500
Iron and steel:					
Iron ore:					
Gross weight thousand metric tons	4,076	3,932	3,433 <sup>r</sup>	3,429 <sup>r</sup>	3,857
Fe content <sup>c</sup> do.	2,200	2,100	1,830 <sup>r</sup>	1,830 <sup>r</sup>	2,060
Metal:					
Pig iron and ferroalloys:					
Ferrochromium	97,240	50,735	11,200	35,393 <sup>r</sup>	28,701
Ferrosilicon	--	5,895	7,245	7,000 <sup>e</sup>	--
Pig iron	300,000 <sup>e</sup>	247,598	157,622	181,080	213,210
Steel, crude including castings thousand metric tons	14,325	14,382	16,046	18,298 <sup>r</sup>	19,868
Lead:					
Mine output, Pb and Pb-Zn ores:					
Gross weight	345,391	388,795	375,592	379,250	407,637
Pb content	17,270	17,923	17,352	17,500	18,650
Concentrates: <sup>c</sup>					
Gross weight	13,000	13,000	13,000	13,000	14,000
Pb content	8,500	8,500	8,500	8,500	9,100
Metal, refined <sup>c</sup>	4,000	4,000	4,000	6,000	6,000
Manganese ore, gross weight <sup>7</sup>	23,300	20,000	20,000	18,000	13,751
Nickel, mine output, Ni content <sup>c</sup>	--	NA	NA	640	--
Silver, mine output, Ag content <sup>8</sup> kilograms	110,000 <sup>e</sup>	118,000 <sup>r</sup>	79,000 <sup>r</sup>	95,000 <sup>r</sup>	73,000 <sup>e</sup>
Zinc:					
Mine output, Zn and Cu-Zn ore:					
Gross weight thousand metric tons	861	816	895 <sup>r</sup>	930 <sup>r</sup>	765
Zn content do.	39	37	46 <sup>r</sup>	47 <sup>r</sup>	44
Concentrates: <sup>c</sup>					
Gross weight	26,000 <sup>r</sup>	25,300 <sup>r</sup>	33,100 <sup>r</sup>	33,600 <sup>r</sup>	33,400
Zn content	26,000 <sup>r</sup>	25,300 <sup>r</sup>	33,100 <sup>r</sup>	33,600 <sup>r</sup>	33,400
<b>INDUSTRIAL MINERALS</b>					
Aluminum sulfate, alunite	12,266	11,531	11,389	10,458	10,920
Barite, crude	120,893	57,373	106,843	119,648	134,504
Boron minerals:					
Run of mine	2,398,220	2,357,592	2,214,064	2,207,092	2,878,930
Concentrates	1,402,000	1,493,361	1,368,000 <sup>r</sup>	1,399,000 <sup>r</sup>	1,697,000
Refined borates	435,000	420,000 <sup>e</sup>	436,000	518,000 <sup>r</sup>	715,000
Cement, hydraulic thousand metric tons	35,825	30,125	32,576	35,077	38,019

See footnotes at end of table.

TABLE 1--Continued  
TURKEY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity	2000	2001	2002	2003	2004 <sup>p</sup>
<b>INDUSTRIAL MINERALS--Continued</b>					
Clays:					
Bentonite	636,273	674,178	559,224	831,146	850,000 <sup>e</sup>
Kaolin	595,415	574,550	372,344	370,455	536,008
Other <sup>e</sup>	6,500,000	2,506,061 <sup>3</sup>	2,500,000	2,500,000	2,750,000
Diatomite	10,000	10,000	10,000	10,000	10,000
Emery	16,830	13,629	15,418	15,402	7,902
Feldspar, run of mine	1,147,716	1,510,293	1,766,387	1,862,310	1,983,336
Fluorspar	4,113	4,093	5,344	718 <sup>r</sup>	880
Glass, crude thousand metric tons	1,300 <sup>e</sup>	1,141 <sup>r</sup>	1,242 <sup>r</sup>	1,315 <sup>r</sup>	1,229
Graphite, run of mine <sup>e</sup>	15,000	15,000	1,393 <sup>3</sup>	942 <sup>3</sup>	1,000
Gypsum, other than that for cement	302,552	328,656	264,038	196,668	250,099
Lime <sup>e,9</sup> thousand metric tons	3,300 <sup>r</sup>	3,200 <sup>r</sup>	3,300 <sup>r</sup>	3,300 <sup>r</sup>	3,400
Magnesite, run of mine	2,672,089	1,450,031	3,044,440	3,224,278	3,732,952
Meerschaut <sup>c</sup> kilograms	500	400	300	200	150
Nitrogen, N content of ammonia	53,400 <sup>e</sup>	67,100 <sup>e</sup>	300,500	289,300	329,400
Perlite, run of mine	149,429	70,738	151,902	136,683	133,829
Pumice	787,081	754,052	820,347	895,616	1,035,975
Pyrites, cupreous, gross weight	561,565	662,872	952,094	1,103,872	765,432
Silica sand, gross weight thousand metric tons	1,485	1,207	1,274	1,283	1,188
Sodium compounds:					
Salt, NaCl, all types do.	2,126	1,771	2,197	2,243	2,158
Soda ash, trona <sup>c</sup> do.	620	640	825 <sup>r</sup>	835 <sup>r</sup>	846
Sodium sulfate, concentrates	456,590	300,000 <sup>e</sup>	562,660	556,575	523,285
Stone:					
Dolomite	957,182	915,441	975,971	1,158,539	2,109,362
Limestone, other than for cement thousand metric tons	30,295	40,572	30,261	28,609	30,963
Marble cubic meters	647,160	460,834	557,630	544,629	668,996
Quartzite	2,743,271	2,085,791	2,006,654	2,908,584	2,961,932
Strontium minerals, celestite: <sup>c</sup>					
Run of mine	40,000	110,000	116,278 <sup>3</sup>	116,000 <sup>3</sup>	100,000
Concentrates	24,150 <sup>3</sup>	63,635 <sup>3</sup>	70,000	70,000	60,000
Sulfur: <sup>c</sup>					
S content of pyrites	45,000 <sup>r</sup>	26,000 <sup>r</sup>	43,000 <sup>r</sup>	50,000 <sup>r</sup>	35,000
Byproduct:					
Petroleum	43,000	51,000	48,000 <sup>3</sup>	42,000 <sup>r</sup>	49,000 <sup>3</sup>
Other	75,000	75,000	75,000	72,000	72,000
Total	163,000	152,000	166,000 <sup>r</sup>	164,000 <sup>r</sup>	156,000
Talc	54,278	883	98	60 <sup>r</sup>	60
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Asphalt, natural	150,000 <sup>e</sup>	150,000 <sup>e</sup>	118,235	217,759	738,915
Carbon black	35,144	35,000	37,413 <sup>r</sup>	6,754	32,686
Coal:					
Hard coal, run of mine thousand metric tons	3,330	3,370	3,313	3,090	2,843
Lignite, run of mine do.	61,315	58,173	49,627	43,749	43,754
Coke and semicoke do.	2,090	1,890	2,080	2,543	2,855
Gas, natural, marketed thousand cubic meters	611,822	600,000 <sup>e</sup>	268,000 <sup>e</sup>	275,947	344,196
Petroleum:					
Crude thousand 42-gallon barrels	19,783	18,370	17,579	16,980	16,270
Refinery products:					
Liquefied petroleum gas do.	7,409	8,019	8,580	7,960 <sup>r</sup>	8,340
Gasoline do.	39,889	24,993	31,634	28,800	27,350
Naphtha do.	15,717	16,656	11,947	10,700 <sup>r</sup>	12,700
Jet fuel do.	11,009	9,496	9,368	13,300 <sup>r</sup>	14,000
Kerosene do.	638	209	312	540 <sup>r</sup>	340
Distillate fuel oil <sup>10</sup> do.	70,333	58,901	59,281	53,800 <sup>r</sup>	53,660
Lubricants do.	4,322	1,736	2,090	1,960 <sup>r</sup>	2,050
Residual fuel oil do.	8,769	56,323	53,077	38,600 <sup>r</sup>	40,270
Asphalt do.	7,764	6,661	7,548	8,550 <sup>r</sup>	8,430
Unspecified <sup>11</sup> do.	3,110	5,969	6,125	2,640 <sup>r</sup>	3,610
Total do.	168,960	188,963	189,962	166,850 <sup>r</sup>	170,750

See footnotes at end of table.

TABLE 1--Continued  
TURKEY: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

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<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>p</sup>Preliminary. <sup>r</sup>Revised. NA Not available -- Zero.

<sup>1</sup>Table includes data available through September 12, 2005. In addition to the commodities listed, large quantities of construction materials (clay, sand, and gravel) are quarried. Also mined are basalt, diabase, granite, onyx, sandstone, serpentine, slate, and travertine for building stone, limestone and gypsum for cement manufacture, and molybdenum, olivine, titanium, tungsten, and zeolite, but information is inadequate to estimate output.

<sup>2</sup>Data are for public sector production only. Data for private sector production are not available, but production is believed to be approximately 30,000 metric tons per year.

<sup>3</sup>Reported figure.

<sup>4</sup>Approximately 70% of gross production is salable product.

<sup>5</sup>Copper mines produce a copper concentrate (of about 22% Cu) and a cupreous pyrite concentrate (of about 0.7% Cu). Copper is not recovered from the cupreous pyrite concentrate.

<sup>6</sup>Data includes estimated content of Turkish copper refinery tankhouse slimes. Prior to 2001, all gold production was the byproduct of base-metals refining.

<sup>7</sup>Does not include manganiferous iron ore from the Deveci Mine, production of which amounts to several hundred thousand metric tons per year and has a manganese content of 3% to 5%.

<sup>8</sup>Includes estimated content of base-metals-refinery tankhouse slimes.

<sup>9</sup>Estimated sales only.

<sup>10</sup>Diesel fuel (gasoil) and special heating oil.

<sup>11</sup>Includes refinery fuel and losses.